Name & Qualifications: Joe Wyche, BE, ME, BComm, CPEng

Date of Birth: 25 November 1948

Position: Director

Memberships: Fellow of the Institution of Engineers, Australia, Civil College
Life Member of Concrete Institute of Australia

GENERAL CAREER EXPERIENCE

EXPERIENCE, 2001-present:

Mr Wyche started up a new firm, Wyche Consulting, in August 2001, after many years of experience in Civil Structural Engineering, especially in Bridge Engineering.

DESIGN FOR WYCHE CONSULTING

- **Seaford Rail Extension, South Australia. 2010 ongoing.** Wyche Consulting provides technical advice on all superstructure construction issues and does temporary works design for this 1200m long incrementally launched single cell box girder rail bridge. The project is made more complex because the bridge is launched simultaneously from each end of the alignment, and internally contains three spans, which must be split and made into single simple spans after the completion of launching. The principle construction design/ advice is the development of the sequencing for launching to meet in the centre, and the sequencing for splitting and setting in final bearings. The temporary works designed include the launch girders, the cast bed and intermediate pier, the side guides and temporary bearings (where required), the pulling system to get initially started, and a separate one for the completion, a temporary restraint system for between launch parking once the bridge is well advanced, and a clamp bearing and temporary sliding bearing system for when launching is completed and the deck splitting sequence starts. Ros MacKinlay principally designed the cast bed and worked out the initial basis for the launching sequences, and Joe Wyche principally designed most other items and systems.

- **Strengthen 2 Bridges, ACT, 2011.** Strengthening design for two similar haunched, skewed, void former prestressed concrete bridges was carried out by SMEC, and verified by Wyche Consulting. The analysis was complicated, and information had to be assembled from very old drawings, which were at times difficult to interpret, and used now obsolete materials. The work was principally carried out by Ros MacKinlay but there was some key input and interpretation from Joe Wyche.

- **Gorgon Jetty Caissons. 2010 ongoing.** Carried a range of support work for Leighton on this large project, which involves building over 50 25m diameter circular concrete caissons down at Henderson, and loading them onto barges which float them up for installation for the jetty on the Gorgon project. Wyche Consulting work comprised (a) looking at precast alternatives to the original design, which did not eventuate, done by Joe Wyche and Ros MacKinlay (b) verification of the ground support slab on which the caissons are built and on which they are jacked up onto load platforms and moved to the barge, done principally by Ros MacKinlay, (c) numerous verifications of falsework and support systems for various construction processes, done by Ros MacKinlay.

- **FE Walker Overpass Bridge. 2010.** Expert technical advice from Joe Wyche for use in a claim action over the prescribed methodology of bearing installation. Client VDM Group.

- **Mine Haul Road Bridge. 2010.** Investigation and costing of several bridge or tunnel alternatives for getting an access across a public road for trucks hauling ore from a mine. Work done by Joe Wyche. Client Wave Engineering solutions.

- **MCC Tunnel. 2010.** Design of temporary works to develop a system to support various components on partially built reinforced concrete ore conveyor tunnel. Client BGC. Work lead by Joe Wyche.

- **Reid Alexander Interchange. 2010.** Joe Wyche provided expert advice and training of KBR engineers to assist through the design of these Super T bridges.

- **Port Botany. 2010.** Joe Wyche provided independent expert advice to PB on structural aspects of a pile headstock for a bridge in a marine environment to resolve issues between a Verifier and Designer.

- **Gorgon 3300 man camp. 2010 ongoing.** Client is TDK JV. Work comprised various temporary works such as cradles for lifting pipe groups, temporary supports for prefabricated buildings, access platforms for loading trucks. Generally the desugn is in structural steel. Work is intermittently on going. Joe Wyche directed and work principally carried out by Ros MacKinlay.

- **Great Eastern Highway Roe Interchange 2010.** Tender design for Leighton working with AECOM. Wyche Consulting designed a haunched precast bridge over the rail route. Work carried out by Joe Wyche and Ros MacKinlay. Unsuccessful tender.

- **Redcliffe Bridge Perth. 2009 ongoing.** Wyche Consulting has carried out an ongoing series of studies into this large box girder bridge over the Swan River on Tonkin Highway, to determine it's capacity to carry rail traffic as well as various road traffic combinations, and also examining the possibility of an adjacent bridge and other infrastructure modifications. This is part of a large overall planning study for the airport rail link for the PTA, but also involves other transport planning study in the area. Principal important work is establishing pile and superstructure capacity. Piles used space frame soil spring interaction models, with second order analysis. and superstructure a sophisticated finite element model.

- **Reid Alexander Interchange 2009.** Tender design for Leighton working with AECOM. Straightforward Super T design. Joe Wyche directed, and work carried out by Ros MacKinlay. Unsuccessful tender.

- **Dampier Highway Bridge 2009.** Tender design for Leighton working with SKM. Wyche Consulting designed modifications and strengthening for and existing reinforced concrete bridge on steel pile piers. Work mainly done by Joe Wyche. Unsuccessful tender.

- **W2W Alliance Design, 2008-2009.** W2W is an Alliance of the Water Corporation (WA), Thiess and Black and Veatch, which is procuring sewerage expansion works at several WA locations. Wyche Consulting has designed various items at Woodman point including pipe bridges and a stainless steel pond cover. These designs involved sifting large amounts of information from many sources, which is often conflicting or irrelevant and assembling it to promptly produce a workable design to fit construction programming and the many constraints of the site. At Beenyup Wyche

designed a complex temporary support system for constructing a 24m diameter precast prestressed concrete digestor roof.

- **Gauteng Freeway Improvement Project, Johannesburg, 2008-9.** Client Structural Systems and G5. Design of two launch girders, temporary bearings and side guides, cast beds and braking system for 4.3% downhill launch for two 150m long incrementally launched bridges and similar works for 400m long curved bridge.

- **Prestressed Concrete Design Seminar, Perth, 2008.** Engaged by Worley Parsons to prepare and present a one day seminar on prestresed concrete theory and design, in conjunction with Structural Systems.

- **Verification and Design Advice Mermaid Jetty Expansion, Dampier, 2008.** Client Worley Parsons, Roam Marine. Joe Wyche had load rated the original jetty several years ago, and now carried out verification on the large multi stage expansion. Involved creating a large complicated 3D space frame model and adjusting within mutually acceptable parameters to obtain agreement with Worley Parsons. Also involved giving design advice on several practical aspects to meet construction requirements with acceptable details.

- **Tender Design for Reid Highway Bridge, Perth, 2008.** Client Leighton. Unsuccessful Tender Design for a major bridge over the upper Swan River Perth. Complicated by the many future design stages required.

- **Woodmans Point Sewerage Expansion Project, Perth, 2008.** Direction of design of footings for overhead pipework. Client W2WA.

- **Dairi Bridge Strengthening Project, Sumatra, Indonesia, 2007.** Client is Ausenco. A minor public road is to be used as a haul road for a new zinc mine, and several small bridges on the route need strengthening. Based on limited drawings, site measurements and observations, and a load test, Wyche Consulting has produced a safe load rating with appropriate restrictions for vehicle location and speed, and a methodology of overcoming the difficult geometry.

- **Coopernook to Heron's Ck Project, NSW, 2007.** Specialist advice role for design of two incrementally launched bridges. Parsons Brinckerhoff and Thiess are in alliance with RTA NSW for this project. Role for Joe Wyche is to review designs for efficiency and value engineering, provide specialized software and advice and training, and specialized advice for specific launch problems such as temporary works. Ongoing at the time of writing.

- **New Perth Bunbury Highway, Perth WA, 2007-9.** $500m Alliance contract with Main Roads, GHD, Leighton and WA Limestone – Southern Gateway Alliance. Joe Wyche directing design for 17 bridges ($110m) at 9 sites, including two incrementally launched pairs of bridges over rivers, and T-roff bridges generally in pairs over water and road crossings. The incrementally launched bridges are 120m and 270m long, and design included all temporary works. T-roffs are large, some in excess of 100 tones and spanning 35m. Widespread soft foundation conditions mean piling and design for staged preloading and large differential settlement. Severe acid sulfate in a number of locations. Technical Advice Group formed with MR to develop from this project generic innovations and procedures for future MR contracts.

- **Review Heavy Vehicle Bridge Route Report.** The National Transport Commission engaged Wyche Consulting to review a report which had been prepared by VicRoads on methodology for Heavy Vehicle Route Planning as controlled by bridge limits.

Wyche Consulting developed a pilot alternative method which was much simpler and more accurate than that proposed in the original report.

- **New Perth Bunbury Highway, Perth WA, 2006.** Tender design in Director/ Lead Engineer role for approximately $90 m of structures, in Leighton/ GHD bid for a competitive alliance contract with Main Roads. Tender successful.

- **Mulroy Bay, Ireland, 2006.** Tender design for incrementally launched approach structures to main span balanced cantilever bridge, for Structural Systems, UK. Unsuccessful.

- **Alfords Point Bridge NSW, 2006.** Re-engineer RTA NSW design of an incrementally launched box girder bridge for Barclay Mowlem. Low bid but Barclay Mowlem taken over by Laing O'Rourke, and did not proceed with the project.

- **Champion Lakes Project, Perth WA, 2006.** Clients Tabec and Benchmark for Armadale Redevelopment Authority. Concept development and design of two bridges to island in Champion Lakes Rowing course. Director role. Investigated several solutions, including precast concrete and steel composite for cost comparisons. Project completed successfully on time.

- **Precast Rail Level Crossing Elements, WA 2005.** Verification/ design advice for precast concrete elements for trucks across level crossing. Client Submec.

- **Woolongong North Distributor Extension, NSW, 2005.** Verification for SMEC of RTA NSW project. 13 bridges and culverts structures including plank bridges, Super T's, cast in situ voided slab, and steel truss pedestrian bridge.

- **Narrows Bridge and Other Structures, Package E, South West Metropolitan Rail Project 2004-7.** SW Metro Rail project Package E works, include the new Narrows Bridge, strengthening the existing second Narrows bridge for rail and other structures such as an overpass bridge at Leach Highway, and barriers and rail impact structures on existing bridges are about $20 m of the total package. The D&C contractor is Leightons, and design partners, GHD, who are the design directors. Lead Engineer role and specialist technical advice and direction for all aspects.

- **Mt Henry Bridge and Canning Br Relocation, Package E, South West Metropolitan Rail Project 2004-7.** SW Metro Rail project Package E works include the new Mt Henry Bridge, the strengthening works on the existing Mt Henry Bridge, and the relocation of Canning Bus Bridge. These works are about $40 m of the total package. The D&C contractor is Leightons, Wyche Consulting are Design Directors, and design partners are GHD. The new bridge is an incrementally launched single cell concrete box girder nestled around the existing 660 m long bridge. This new structure will carry three lanes of traffic and release capacity in the existing bridge for two railway line and the remaining three traffic lanes. It will be incrementally launched with temporary piers at half points of the 76 m spans. The existing bridge will be strengthened for the new rail loads and to carry much heavier vehicle loads in the three traffic lanes. This will be achieved with stress bar diagonal hangers over about 5 m of bridge length at each pier, all inside the box, and extra external prestress. Mr Wyche is Design Director in charge of all these works, and designer of the new Mt Henry Bridge superstructure.

- **Tender Design Mt Henry Bridge widening, Package E of the South West Metropolitan Rail Scheme, Perth 2003.** This is a very complex design for widening a major bridge which stretches 660 metres across the Canning River. The bridge must be widened symmetrically about 6 metres on each side, and with 76 metre

spans and the requirement to incorporate a lower level footway, the Tender design is in itself a major challenge. Wyche Consulting worked in partnership with GHD for Leighton, and Mr Wyche was Design Director and was directly involved in developing analytical methods, and the analysis and design of the integrated bridge, based especially on the capacity limits of the existing bridge given in the SWTC. The bid was successful, although during the course of the Tender the design changed to a separate bridge.

- **Conveyor Belt and Vehicle Bridges, Yandi Expansion Project, WA, 2003.** Design Engineering Study, for Barclay Mowlem/ Rio Tinto. Two bridges for conveyor belts and light vehicles (a) over flood prone Marrillana Creek, and (b) over a rail alignment. Bridges chosen were steel composite. Another solution was used for the rail alignment, but the final choice was made to build a 320 m long bridge as designed by Wyche Consulting at Marillana Ck. This has been successfully built, and incorporated prefabricated steel and concrete deck segments built in Perth and assembled on site, to minimise on site labour and skills. The 8 m high pile piers and cross heads were a simple arrangement of large circular sections, eliminating the need for bracing, and detailed to allow simple site erection and adjustment for driving tolerance. Mr Wyche was Design Director for this project and also carried out design work on various components.

- **Tender Design of Structures, Geraldton Southern Transport Corridor, 2003.** Lead designer for tender design of 5 road bridges over road or rail varying from lengths of 15 to 70 m and with spans to 23 m, and rail culvert/ tunnel 100 m long. Value of structures $9 m. Client BGC/ John Holland JV, and GHD Consulting. Unsuccessful.

- **Abutment Design for Bridge 1551 on Tom Price Karratha Rd, WA 2003.** Successful design and construct with Barclay Mowlem for the abutment support frame within reinforced earth abutments, 9 metres high.

- **Nicholson Rd Subway, 2002.** In partnership with SKM designed a replacement structure for the Nicholson Road Subway. This is a very tight geometry situation and timeframe. The solution developed by Wyche Consulting was to use 1200 wide precast prestressed planks transversely stressed for longitudinal shear connectivity. This solved the procurement problems inherent with other solutions and provides a durable structure with craneable elements which can be built in the narrow time window available.

- **Kenwick Rail Tunnel Extension, 2002**
  Undertook preliminary design for the extension of the Kenwick Rail Tunnel. Numerous construction options were investigated for the buried concrete box structure, which was to carry two passenger railway lines with a freight railway line passing over on a large skew. Unsuccessful D&C for Barclay Mowlem.

- **PURD Consulting Panel, 2002.** Wyche Consulting has received a two year appointment to the PURD panel of specialist consultants. Advice will be provided on an as required basis on bridges, structures and railway sleepers.

- **PURD Package A, 2002.** The $1400m Perth Urban Rail Development scheme is being designed in a series of packages, parts of which are preparing material for D&C, and some direct design. Wyche Consulting acted as a sub consultant to SKM who with JV partner Maunsell designed Package A. Package A is worth about $280m and includes about 15 bridges or tunnels, which were prepared for D&C. Joe Wyche had a Lead Engineer role in this work.

- **4 Bridges in Kimberley region of WA, 2002.** Joe Wyche is the Lead Engineer for Wyche Consulting, who are the bridge designers in the Worley team, which is designing a suite of 4 bridges ranging in length from 80 to 120 metres. The client is Main Roads WA. These bridges just north of Hall's Creek will improve the flood trafficability of the Great Northern Highway in this area. Design work almost completed at the time of writing.

- **PT Terminal Petokemas, Surabaya, Indonesia, 2002.** In partnership with SKM, Wyche Consulting gave advice to client P&O about cracking in the 1600 m long container terminal access bridge in Surabaya. The report explains that the cracking is caused by heat of hydration effects occurring during precasting and caused by the section shape. The diagnosis resulted in a potential saving of $AU 2m because it demonstrated that planned carbon fibre strengthening is not required. A further outcome is that a load rating of the bridge was carried out as an extension of the brief.

- **Liverpool Parramatta Transitway Barriers, Sydney 2002.** Design of several kilometers of bridge barriers for a bus transitway for Abigroup. The innovative solution developed offers significant savings to the client and provides a high degree of assurance to RTA of the performance of the barriers. The solution developed involved using a series of discrete footings with the barrier spanning in flexure and torsion between them. This produced large savings in the footings and allowed the barriers to be slipformed.

- **Review Bridge Management System MRWA, Perth, 2002.** MRWA/ Austroads needed a review in PIARC format of their Bridge Management System, to meet commitments to provide international benchmarking and information exchange.

- **Reinforced Concrete Precast Arch Segments, Pacific Highway Upgrade, Yelgun to Chinderah, NSW, 2002.** On this project there are two locations each of which has a twin pair of road tunnels 40 to 45 m long, and each tunnel has a 15 m span arch roof. In conjunction with SMEC Mr Wyche designed these roof arch segments for Abigroup, enabling them to bypass the market position held by the proprietary companies like RECO and CSR Humes. Mr Wyche had previously designed the foundations for these arches while at BG&E. A further development in which he also played a key design role was the end wall gabion, especially where it structurally interacts with the concrete arch.

- **Technical Advice on Claim for Narrows Bridge Project, Perth, 2001/2.** This claim was successfully settled. Joe Wyche provided independent verification of some important design calculations related to incrementally launching a very complex and varying cross-section. Advice was provided to client, legal firm Allens Arthur Robinson.

- **Technical Advice on Eddystone Ave Bridge, Perth, 2001/2.** MRWA required expert external advice on aspects of a submitted alternative Tender, and subsequently on the complex geometry of launching a bridge curved in plan.

- **Bradshaw Field Training Access Bridge over Victoria River, NT, 2001.** The client, SKM, offered a successful alternative design for Steelcon. The bridge is precast planks of 22.5 m span on 12 m high twin concrete column piers. Mr Wyche designed the superstructure, provided in service loads to SKM for the substructure, provided specialist advice on the substructure arrangement, and verified the substructure.

- **Temporary Works on Northam Bypass Project, WA, 2001.** Barclay Mowlem required calculations and design for a braking system for safety during a downhill launch of a 220 m long bridge.

EXPERIENCE, 1990 - 2001 Associate and Senior Engineer, Bruechle Gilchrist & Evans Pty Ltd

BRIDGE DESIGN FOR BG&E

The following is a list of significant projects in which Mr Wyche had a major design role and which have been built. These projects incorporate all phases of design and documentation of major and minor bridges, including planning, feasibility and concept development, analysis, design, specification, and management recommendations. Materials include prestressed and reinforced concrete, steel composite, and both conventional and prestressed timber. Foundation systems include spread footings, cast in place piles, and concrete and steel displacement piles. Several of the projects required development of specialised bridge design and analysis software. There have been numerous other smaller projects, or peripheral advice roles.

- **Pacific Highway Upgrade Yelgun to Chinderah, NSW, 2001, Lead Designer.** D&C for Abigroup in alliance with SMEC. BG&E designed all the overpass bridges, which included:
  - A post-tensioned pre-stressed concrete cast in situ twin T beam, with spans of 50 and 45 metres on a 55 degree skew.
  - Two concrete arch bridges spanning over 50 metres, supporting plank bridge superstructures on precast portal frames down to twin arches.
  - 7 Super T bridges spanning up to 38 metres, integrated architecturally along the route with a “family” of piers, of varying heights.
  - Four precast concrete arch tunnel structures for fauna access.

- **Canning Highway Bus Bridge Duplication, Perth, 2001, Senior Designer for Launch Girder Connection.** Incrementally Launched curved box girder over Kwinana Freeway near Canning Bridge.

- **Pedestrian Cycleway Bridges. Perth, 2000, Lead Designer to Concept Design and early final Design Stage.** Bridges at Nash Street, Stirling Road and Powis Street were designed for MRWA. Three cycleway bridges are adapted to the sites to provide the best possible cycling grade lines and allow ease of construction in congested situations close to railway lines and/or heavily trafficked roads. Careful attention was also paid to Urban Design aspects so the bridges fitted well into their local environment of adjacent bridges.

- **Loftus Street Bridge, Perth, 1999, Lead Designer.** D&C for Thiess. The bridge is 82 m long, significantly skewed, 6 lanes with 2 spans, 47 and 35 m. It comprises a separately incrementally launched pair of box girders, which have to be structurally joined longitudinally to an existing bridge and to each other. Architectural compatibility with the existing bridge is also required. Construction access is very tight, and the bridge crosses Mitchell Freeway and several Electrified Rail lines, all of which have to be kept fully operational during construction. The design and construct brief included all construction engineering.

- **Gascoyne River Bridge, Carnarvon, WA, 1999, Lead Designer for 1st version (pre-M1600 Loadings).** Designed for MRWA. The bridge has a length of 230 m, with nine spans, and two lanes with provision for future footway. It comprises a steel/concrete composite superstructure, with concrete wall piers and abutments on steel piles.

- **Graham Farmer Freeway Stage 2, Perth, 1999, Senior Designer for East Abutment soft ground structure, Windan Bridge, and Concept Design of Minor Bridges.** D&C for Transfield Thiess Joint Venture. The main bridge has 9 spans and is 403 m long, and architecturally integrated with the adjacent Goongoongyup Rail Bridge. Incrementally launched twin prestressed concrete box girders carry six lanes and a lower level footway, and two extra 40 m end spans to accommodate soft ground approaches. Concrete piers and abutments on deep steel piled foundations.

  7 ancillary bridges span various roads or rail locations and comprise on site precast post-tensioned spans, some continuous, 20 to 30 m, placed on concrete piers on spread footings. These superstructures were specially designed to meet the Main Roads architectural brief.

- **Bennett Brook Bridge Perth, 1996, Lead Designer.** Preliminary Design for MRWA, then D&C for Barclay Mowlem. This is a 56 m single span, 20 m wide highly skewed bridge with concrete abutments on steel piles. It had to be built over an Aboriginal sacred site without construction activity between abutments. Three 3 pairs of shallow inverted arch fabricated steel girders were craned in and made composite with an in-situ concrete deck cast on Transfloor permanent forms. The design and construct brief included all construction engineering.

- **Goongoongyup Railway Bridge, Perth, 1995, Senior Designer for East Abutment in Soft Ground and Western Restraining Abutment.** Design for Westrail. The bridge is 403 m long and carries two rail tracks, and a lower level footway. It is a single incrementally launched prestressed concrete box girder on concrete piers and abutments, with a 40 m approach structure to accommodate soft ground. Piles are steel or steel composite.

- **Australind Bypass, WA Drafting for Main Roads and Construction Engineering, 1995, Lead Designer.** Drafting for MRWA, D&C for Barclay Mowlem. This bridge is 128 m long, and crosses the Collie River. It has five spans, and has two lanes plus footway. The superstructure comprises prestressed concrete twin T-beams, incrementally launched. It has concrete piers to pile foundations. BG&E drafted a mirror image duplicate of the existing structure with suitable geometry modifications and designed the temporary works including the casting bed and launch girder modifications.

- **Jarrahdale Road over ALCOA haul road, WA, 1995, Lead Designer.** D&C for Leighton. This is a 32 m highly skewed single span, carrying two lanes plus footway on reinforced earth abutments. The superstructure comprises 8 on-site precast post-tensioned T beams craned into position and joined with longitudinal infills. A two stage application of prestress was used which produced excellent control of the final deflected shape with this heavily prestressed precast section which had a restricted depth allowance. The design and construct brief included all construction engineering.

- **Tung Chung Second Sea Channel Crossing (Hong Kong), 1995, Lead Designer** D&C for Structural Systems. There are two three lane road bridges 290 m long with 7 spans. Each is a prestressed concrete box girder on concrete piles, piers and abutments. BG&E redesigned the launching prestress and designed temporary works including casting bed and launch girders and ancillary equipment.

- **Tung Chung Sea Channel Crossing, Hong Kong, 1994, Lead designer.** D&C for Leighton Asia. There are two road bridges, each with three lanes, and a rail bridge all 325 m long with 8 spans. Each is a single prestressed concrete box girder on concrete piles, piers and abutments. BG&E redesigned the launching prestress and designed temporary works including the casting bed, launch girders and ancillary equipment. The project was well behind schedule but launching three bridges simultaneously gained five months to more than restore the schedule.

- **Port Bouvard Bridge, Mandurah, WA, 1993, Lead Designer.** D&C for Thiess. The bridge is 360 m long with eight spans, carrying four lanes with lower level footways and internally is a services bridge. The superstructure is twin three metre high prestressed concrete I beams. These unusual large I beams enabled incremental launching with minimal handling of forms, assisting in meeting the strict one week cycle. Piers are 19 m high tapered columns with an inverted truncated cone capital, set on a pile cap with ends pointed to deflect impacting vessels. There are large bored pile foundations in the channel. The columns, pile caps and slender superstructure make a graceful architectural whole well suited to this prime location. Design and construct brief included all construction engineering.

- **Bridge Refurbishment Period Consultancy for Main Roads, 1991-3 & 1997 ongoing, Lead Designer for approx 3 years.** Design for MRWA, for about 200 constructed projects, ranging from simple minor repairs to major refurbishment/reconstruction. Work is generally on short span timber bridges which are typically converted to a hybrid of timber, concrete and steel. A number of concrete bridges have also been refurbished, and strengthened.

- **Northern Suburbs Transit System Bridges, Perth, 1992, Lead Designer for 4 of 7 bridges.** Design for MRWA and Westrail. There are three road bridges and four rail bridges, comprising:

    - At Vincent Street, a four lane road bridge and a two line rail bridge, each with four spans, and a total length of 89 m.
    - At both Powis Street and Scarborough Beach Road, a three lane road bridge and rail bridges each with three spans and a total length of 59 m. There is a single two line rail bridge at Powis Street, and at Scarborough Beach Road two separate single line bridges accommodate the station geometry.

    All bridges are skewed, especially Vincent Street, and provision had to be incorporated for a future extra road lane. Substructures were reinforced concrete on spread footings.

    For architectural compatibility with the existing freeway bridges the external cross-section is a wide trapezoid for the road bridges, and a pair of narrower trapezoidal sections for the rail bridges. Internally the road bridges have series of transversely placed void formers allowing tranversely spanning voided slab construction between solid “beams” at the ends of the void formers, allowing safe high speed construction over heavy traffic, using incremental launching, where the designs were carried out so that the equipment could be moved to each subsequent location with minor amendments.

PLANNING STUDIES FOR BG&E

Multi-disciplinary team planning studies for evaluation of future projects involving roads, bridges and tunnels. Evaluation included cost, constructability, environmental impact, and traffic management. Projects include:

- Feasibility study to symmetrically widen Mt Henry Bridge, Perth from 6 to 8 lanes over 760 m. 1999.
- Planning study for Tonkin Highway extension south to Byford, Perth (with BSD Consultants) 1998.
- Study of Road/Rail intersections for the southern rail link Perth to Mandurah. 1998.
- Planning Report on Interchange Options and Elevated Light Rail Structure, Bangalore, India. 1995
- Australian Bridge Design Code committee member. 1985-1994.

- Study of Precast Bridge Alternatives for Main Roads, Western Australia. 1994.
- Stirling Link Road/ Bridge Study, Perth. 1993.

TENDER DESIGNS OR ALTERNATIVE DESIGNS FOR BG&E

Apart from projects which have been designed and built, Mr Wyche has had a lead or senior role in a number of tender or alternate designs. The following include only those which resulted in a full Tender design leading to a submitted bid:

- Terragong Swamp Bridge, Kiama, NSW, 2000. 900 m incrementally launched double box girder second placed bid.

- Thompson River Project, NSW, 2000. Low-cost precast composite structure, Queensland 1998, second placed bid.

- Hallam ByPass, Melbourne, 2000. 2 span Super T, and arch footbridge, unsuccessful.

- Brisbane Inner City Bypass, 1999. Mixture of precast and launched bridges, with complicated geometry, in conjunction with SMEC, second placed bid.

- Wan Chai Bridge Hong Kong, 1996. Mixture of precast and cast in situ structures with complicated geometry, unsuccessful.

- Maribyrnong Bridge, Victoria, 1994. Large twin double I beam launched separated pair of bridges with provision for future joining to increase bridge deck width, second placed bid.

OTHER WORKS FOR BG&E

Specialised design, investigation and report writing on components in various structures including buildings, jetties, concrete railway sleepers, temporary works.

EXPERIENCE, 1974 - 1990 Main Roads (WA), Bridge Branch to Senior Designer Level.

Involved in all aspects of bridge design and management including:

- hydraulic investigation and design
- design of 7 concrete bridges
- research into material properties, thermal effects, and in service vehicle loads on bridges
- writing sections of Austroads Bridge Design Code and SAA Concrete Structures Standard
- specialised software development
- design of timber bridge refurbishments
- development and implementation of Bridge Management System

EXPERIENCE, 1970 - 1974 Main Roads Western Australia

Urban road design and Metropolitan road construction.

PROFESSIONAL ACTIVITIES

- Author/presenter of numerous Technical Papers, published in ACI Journal, CIA Conference Proceedings, Austroads Bridge Conference Proceedings, ARRB Proceedings and various other forums.

  Subjects include designing for torsion in Super T's, vehicle loads, relaxation modified thermal secondary loads on bridges, ductility/redistribution and prestress secondary

effects, section analysis, concrete beam deflection/cracking, concrete creep, shrinkage and relaxation, weigh-in-motion systems (including development of Culway), bridge management systems, and hydrology and hydraulics of bridges.

- Membership for various periods over many years of a number of Professional Groups/Committees including:

  - Chairman Organising committee for CIA National Conference 2011.
  - Steering Committee for Austroads Bridge Conference 2006.
  - MR Bridge Technical engineering Reference Group.
  - Standards Australia Committee for Concrete Structures Standard.
  - Standards Australia Committee for Cement Standards
  - IEA Structures Panel WA Branch
  - IEA National Committee for Structural Engineering
  - IEA Concrete Panel WA Branch, as Chairman (1987-88) abolished Concrete Panel to form CIA Branch
  - CIA WA Branch committee member 14 years including President 1996-97.
  - CIA Offshore Structures Committee founding chairman 1995-7
  - CIA NSW Branch Committee member 2000- 2001.